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Mothers' Child-Feeding Practices Are Associated with Children's Sugar-Sweetened Beverage Intake[1–4]

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Abstract

Background: Sugar-sweetened beverage (SSB) intake is a substantial source of energy in the diet of US children.

Objective: We examined the associations between mothers' child-feeding practices and SSB intake among 6-y-old children.

Methods: We analyzed data from the Year 6 Follow-up of the Infant Feeding Practices Study II in 1350 US children aged 6 y. The outcome variable was child's SSB intake. The exposure variables were 4 child-feeding practices of mothers: setting limits on sweets or junk foods, regulating their child's favorite food intake to prevent overconsumption, pressuring their child to eat enough, and pressuring their child to ''clean the plate.'' We used multinomial logistic regression and controlled for child and maternal characteristics. Analyses were stratified on child weight status.

Results: The consumption of SSBs ≥1 time/d was observed among 17.1% of underweight/normal-weight children and in 23.2% of overweight/obese children. Adjusted ORs (aORs) of consuming SSBs ≥1 time/d (vs. no SSB consumption) were significantly lower in children whose mothers reported setting limits on sweets/junk foods (aOR: 0.29; 95% CI: 0.15, 0.58 for underweight/normal-weight children; aOR: 0.16; 95% CI: 0.03, 0.79 for overweight/obese children). SSB intake was higher among underweight/normal-weight children whose mothers reported trying to keep the child from eating too much of their favorite foods (aOR: 2.03; 95% CI: 1.25, 3.29). Mothers' tendency to pressure their children to consume more food or to ''clean the plate'' was not associated with child's SSB intake.

Conclusions: SSBs were commonly consumed by young children. The odds of daily SSB intake were lower among children whose mothers set limits on sweets/junk foods regardless of child's weight but were higher among underweight/normal-weight children whose mothers restricted the child's favorite food intake. Future studies can investigate the impact of alternatives to restrictive feeding practices that could reduce children's SSB intake. *J Nutr* 2015;145:806–12.

Keywords: child-feeding practices, sugar-sweetened beverage, children, Infant Feeding Practice Study, obesity, sweet foods

Introduction

Sugar-sweetened beverage (SSB)[7] intake contributes a substantial amount of energy in the diet of US children (1). On the basis of the 2010 *Dietary Guidelines for Americans*, SSBs are defined as beverages sweetened with sugars that add calories. SSBs include, but are not limited to, regular soda, fruit drinks, coffee/tea drinks, and sports and energy drinks (2). On the basis of the 2009–2010 NHANES, energy intake from SSBs was 69 kcal [4.5% of daily energy intake; equivalent to approximately half of a 12-ounce (355 mL) can of soda] among children aged 2–5 y and 118 kcal [6.3% of daily energy intake; equivalent to approximately three-quarters of a 12-ounce (355 mL) can of soda] among children aged 6–11 y on a given day (1, 3). More than 50% of energy intake from SSBs is consumed at home among US children and adolescents aged 2–19 y (1), and several home-related factors have been associated with children's SSB intake, including permissive parenting styles (4), parents' SSB intake (5, 6), and availability of SSBs in the home (6–8). Furthermore, frequent consumption of SSBs was related to adverse outcomes in youth, including obesity (9–11), dental

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[3] The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.
[4] Supplemental Table 1 is available from the ''Online Supporting Material'' link in the online posting of the article and from the same link in the online table of contents at http://jn.nutrition.org.
[7] Abbreviations used: aOR, adjusted OR; IFPS, Infant Feeding Practices Study; SSB, sugar-sweetened beverage; Y6FU, Year 6 Follow-up.
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caries (12), asthma (13), displacement of nutrient-rich foods (14, 15), and poor academic grades (16).

Parents have an impact on the developing eating behaviors of their children (17). Specifically, parents' child-feeding styles influence children's food intake (17). For example, on the basis of experimental studies (18, 19), when sweet and savory snack foods were in plain sight but 3- to 6-y-old children were told they could not have them, children's interest in and intake of these snack foods increased later on after gaining access to these snack foods as a result of restriction (compared to similar foods that had not been restricted). In addition to findings from experimental studies (18, 19), results of a longitudinal study revealed that girls with mothers who reported restricting their daughters' intake of palatable snacks when daughters were 5 y old had higher energy intakes when given free access to snacks after a meal as 7–9 y olds (20). Although associations between parents' child-feeding practices and children's snack food intake have been studied (18–20), there is limited information on whether or not mothers' child-feeding practices are associated with SSB intake among children. Furthermore, snack food intake has been linked to SSB intake in young children. For example, a previous study showed that the consumption of dessert (e.g., cakes, cookies, and pies) and sweet snacks (e.g., candy) was higher among children (aged 2–5 y) with high SSB intake (≥200 kcal/d) than in non-SSB consumers (21). The objectives of our study were to describe children's SSB intake and mothers' child-feeding practices by child and maternal characteristics and to examine associations between mothers' child-feeding practices and SSB intake among children at 6 y of age.

Methods

Study population and survey administration. We used data from the Year 6 Follow-up (Y6FU) of children who participated in the Infant Feeding Practices Study (IFPS) II, which was conducted by the FDA and the CDC between 2005 and 2007. In 2012, the Y6FU survey was conducted by the FDA and the CDC as a follow-up cross-sectional study to collect information on dietary intake, behavioral outcomes, and health conditions of these children at age 6 y. For the Y6FU survey, 48% of children who participated in IFPS II were lost to follow-up at age 6 y (22). Those who did not participate in the follow-up survey had a significantly higher proportion of mothers aged 18–24 y, mothers who were not married, those who had a high school education or less, and those with an income-to-poverty level <185% than did those who participated in the Y6FU survey (22). Parents/caregivers (mainly mothers) were asked to complete the Y6FU study. The FDA Institutional Review Board approved the IFPS II Y6FU study. This secondary analysis, using deidentified data, was deemed exempt by the CDC Institutional Review Board.

Outcome variable. The outcome variable was SSB intake (i.e., regular soda, fruit drinks, sports drinks, and other SSBs) during the past month among children at 6 y of age, which was based on 2 questions. Parents/caregivers were asked, "During the past month, how often did your 6-y-old drink regular soda or pop that contains sugar? Don't include diet soda or diet pop" and "During the past month, how often did your 6-y-old drink sweetened drinks: Kool-Aid, lemonade, sweet tea, Hi-C, cranberry cocktail, Gatorade, etc.?" Parents/caregivers reported frequencies of beverage intake per day, per week, or per month. Weekly or monthly consumption was converted to daily consumption in the analysis. To calculate overall SSB intake, the intake frequency of regular soda and other SSBs was summed. We categorized SSB intake into 0 times/d, >0 to <1 time/d, and ≥1 time/d. The cutoff of drinking SSBs 1 time/d was selected to identify habitual SSB consumers (i.e., daily intake of SSBs) (23, 24) and was based on clinical studies (25, 26). Of note, SSB intake in our study ranged from 0 to 8 times/d, and only 2 children (1 underweight/normal-weight child and 1 overweight/obese child) consumed SSBs 8 times/d.

Exposure variables. The exposure variables were 4 child-feeding practices of mothers. The 4 questions were adapted from the Child Feeding Questionnaire, which has 31 items for measuring parents' child-feeding attitudes and practices (27). Although the validity of these 4 questions alone was not tested, the whole instrument itself has been somewhat validated and the 4 questions chosen were based on their high loading values in the previous factor analysis conducted by the original instrument developer and their correlations with child's weight status found in previous studies (27–29). Parents/caregivers were asked to rate the 4 following statements: "I make sure that my child does not eat too many sweets or junk foods" (also used as "setting limits on sweets or junk foods" throughout the article); "If I did not guide or regulate my child's eating, my child would eat too much of his or her favorite foods"; "I am especially careful to make sure my child eats enough"; and "How often do you encourage your 6-y-old to eat all of the food on his or her plate?" The first 2 items were selected from the restriction subscale of the Child Feeding Questionnaire, and the second 2 were selected from the pressure to eat subscale from the Child Feeding Questionnaire (27).

Response options were rated as 1 = disagree, 2 = slightly disagree, 3 = neither disagree nor agree, 4 = slightly agree, and 5 = agree, except for the item "How often do you encourage your 6-y-old to eat all of the food on his or her plate," which was rated as 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always. Each measure of mothers' child-feeding practices was dichotomized into "yes" ("4" and "5" on the Likert scale) vs. "no" ("1," "2," and "3" on the Likert scale) with "yes" indicating a high maternal control, either by limiting or pressuring food intake.

Child and maternal characteristics from the Y6FU survey. Children's characteristics included sex and children's weight status on the basis of mothers' measurement of their children's weight and height according to instructions included in the Y6FU questionnaire. Child's weight status was dichotomized. Overweight/obese was defined as sex-specific BMI-for-age ≥85th percentile vs. underweight/normal-weight (<85th percentile) on the 2000 CDC growth charts (30). For maternal characteristics, we included age (≤34, 35–44, or ≥45 y), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, or other race), education (high school or less, some college, or college graduate), marital status (married/domestic partnership or not married), annual household income (≤$34,999, $35,000–$74,999, $75,000–$99,999, or ≥$100,000), and weight status [underweight/normal weight: BMI (in kg/m^2) <25; overweight: BMI 25 to <30; obese: BMI ≥30] (31) on the basis of self-reported weight and height data. Children with missing data on maternal characteristics were excluded from analyses when the variable was used.

Statistical analysis. Of those 1542 children at 6 y of age who participated in the IFPS II Y6FU survey, 192 were excluded because of missing data on SSB intake, weight status, and/or mothers' child-feeding practices and an additional 171 were missing information on covariates, leaving an analytic sample of 1350 children for crude analysis and 1179 children for adjusted analysis. On the basis of an experimental study (32), it is possible that a mother with an overweight/obese child might try to limit her child's food/beverage intake because of the child's weight status. To address potential reverse causation, all analyses were stratified by child's weight status. We used chi-square tests to examine unadjusted associations between *1*) child and maternal characteristics and child's SSB intake, *2*) child and maternal characteristics and mothers' child-feeding practices, and *3*) mothers' child-feeding practices and child's SSB intake among 6-y-olds. For chi-square tests, a P value ≤0.05 was considered significant. Multinomial logistic regression analysis was conducted to estimate adjusted ORs (aORs) and 95% CIs for examining the associations between mothers' child-feeding practices and child's SSB intake after controlling for child's sex, maternal age, maternal race/ethnicity, maternal education, marital status, annual household income, and maternal weight status. When the CI did not include 1, it was considered significant. The reference group for the multinomial logistic regression analysis was SSB intake of 0 times/d. For this multinomial logistic regression model, all 4 maternal child-feeding practices were included in 1 model with the aforementioned covariates, because there was no multicollinearity among the 4 child-feeding practices of mothers

based on the IFPS II Y6FU study data set. We used SAS software (version 9.3) to perform all statistical analyses.

Results

Table 1 shows child and maternal characteristics and child's SSB intake during the past month among 1350 children aged 6-y-old after stratification by child's weight status. Approximately 50% of the children were boys and 23.6% were overweight/obese. Of mothers, 57.2% were aged 35–44 y, 86.9% were non-Hispanic whites, 49.8% were college graduates, 86.3% were married or in domestic partnerships, 58.5% had an annual household income of <$75,000, and 43.7% were underweight or normal-weight. Approximately 17.1% of underweight/normal-weight children consumed SSBs ≥1 time/d, whereas 23.2% of overweight/obese children consumed SSBs ≥1 time/d. Maternal education and annual household income were significantly associated with child's SSB intake among underweight/normal-weight children only ($P \leq 0.05$, chi-square test). Specifically, the proportion of underweight/normal-weight children consuming SSBs ≥1 time/d was the highest among children with low-education mothers (27.6%) and among children living in low-income households (22.0%) (Table 1).

Eighty-nine percent of mothers with underweight/normal-weight children and 85.9% of mothers with overweight/obese children reported that they set limits on sweets or junk foods. Approximately 66% of mothers with underweight/normal-weight children and 71.2% of mothers with overweight/obese children reported trying to restrict the child's intake to keep the child from eating too much of his/her favorites foods, and this child-feeding practice was significantly associated with maternal weight status among underweight/normal-weight children only. Approximately 64% of mothers with underweight/normal-weight children and 60.2% of mothers with overweight/obese children were especially careful to make sure their child ate enough, and this was significantly associated with maternal race/ethnicity, education, and annual household income among underweight/normal-weight children and maternal age, race/ethnicity, education, marital status, and annual household

TABLE 1 Respondents' characteristics and prevalence of SSB intake in the past month at age 6 y: IFPS II Year 6 Follow-up Study, 2012[1]

		SSB intake during the past month among children at 6 y of age by child's weight status, %					
		Underweight/normal-weight children (n = 1031; 76.4%)			Overweight/obese children (n = 319; 23.6%)		
Characteristic	n (%)	0 times/d	>0 to <1 time/d	≥1 time/d	0 times/d	>0 to <1 time/d	≥1 time/d
Total	1350 (100)	20.5	62.5	17.1	13.5	63.3	23.2
Child's sex (n = 1350)							
M	677 (50.2)	19.8	63.9	16.4	13.4	59.9	26.8
F	673 (49.9)	21.1	61.1	17.8	13.6	66.7	19.8
Child's BMI percentile[2] (n = 1350)	55.1	41.9	43.1	44.5	93.7	94.0	94.4
Maternal age (n = 1344)							
≤34 y	471 (35.0)	17.1	63.0	19.9	14.9	65.8	19.3
35–44 y	769 (57.2)	22.6	62.1	15.3	11.6	63.0	25.4
≥45 y	104 (7.7)	20.0	62.4	17.7	26.3	47.4	26.3
Maternal race/ethnicity (n = 1233)							
White, non-Hispanic	1072 (86.9)	19.7	63.2	17.2	13.9	63.1	23.0
Black, non-Hispanic	43 (3.5)	21.7	60.9	17.4	10.0	70.0	20.0
Hispanic	63 (5.1)	21.4	57.1	21.4	9.5	66.7	23.8
Other, non-Hispanic	55 (4.5)	22.2	57.8	20.0	20.0	60.0	20.0
Maternal education (n = 1278)							
High school or less	158 (12.4)	14.3*	58.1*	27.6*	9.4	60.4	30.2
Some college	484 (37.9)	17.7*	58.8*	23.5*	12.2	63.3	24.5
College graduate	636 (49.8)	21.8*	67.0*	11.2*	16.5	66.1	17.4
Marital status (n = 1279)							
Married/domestic partnership	1104 (86.3)	19.7	63.2	17.1	12.5	65.7	21.8
Not married	175 (13.7)	18.5	63.0	18.5	16.1	55.4	28.6
Annual household income (n = 1239)							
≤$34,999	258 (20.8)	14.1*	63.8*	22.0*	11.1	54.3	34.6
$35,000–$74,999	467 (37.7)	19.4*	59.7*	20.9*	12.8	64.1	23.1
$75,000–$99,999	227 (18.3)	20.5*	66.0*	13.5*	9.5	66.7	23.8
≥$100,000	287 (23.2)	22.5*	66.5*	11.0*	19.6	70.6	9.8
Maternal weight status[3] (n = 1336)							
Underweight or normal-weight	584 (43.7)	24.2	60.5	15.3	14.8	60.2	25.0
Overweight	362 (27.1)	17.5	64.3	18.2	17.2	60.2	22.6
Obese	390 (29.2)	17.1	64.0	19.0	9.9	67.4	22.7

[1] SSBs include regular soda, sweetened drinks such as Kool-Aid (Kraft Foods, Inc.), lemonade, sweet tea, Hi-C (Coca-Cola Company), cranberry cocktail, Gatorade (Gatorade, Inc.), and others. Values represent sample distributions; percentages may not add up to 100% because of rounding. *$P \leq 0.05$ (chi-square test). IFPS, Infant Feeding Practices Study; SSB, sugar-sweetened beverage.
[2] Values are means.
[3] Underweight/normal-weight = BMI (in kg/m^2) <25.0; overweight = BMI of 25 to <30; obese = BMI ≥30.

TABLE 2 Mothers' child-feeding practices by characteristics and child's weight status: IFPS II Year 6 Follow-up Study, 2012[1]

			Mothers' child-feeding practices,[2] % yes							
	Sample size by child's weight status, *n*		Make sure that my child does not eat too many sweets or junk foods		If I did not guide or regulate my child's eating, my child would eat too much of his/her favorite foods		Especially careful to make sure my child eats enough		Encourage my 6-y-old to eat all of the food on his/her plate	
Characteristic	UW/NW children	OW/OB children	UW/NW children	OW/OB children	UW/NW children	OW/OB children	UW/NW children	OW/OB children	UW/NW children	OW/OB children
Total (*n* = 1350)	1031	319	89.0	85.9	66.2	71.2	64.4	60.2	59.4	53.6
Child's sex	1031	319								
M	520	157	88.7	84.7	66.0	66.2	61.9	59.2	60.6	54.1
F	511	162	89.4	87.0	66.3	75.9	66.9	61.1	58.1	53.1
Child's mean BMI percentile	1031	319	42.9	93.8	44.1	93.9	42.0	94.0	41.3	93.8
Maternal age	1030	314								
≤34 y	357	114	89.1	89.5	67.0	73.7	67.5	71.3*	61.6	58.8
35–44 y	588	181	88.6	85.1	66.3	70.2	62.2	53.6*	57.0	51.4
≥45 y	85	19	91.8	73.7	61.2	73.7	67.1	57.9*	67.1	31.6
Maternal race/ethnicity	938	295								
White, non-Hispanic	828	244	88.2	84.8	66.7	72.5	62.8*	55.3*	57.4*	50.8
Black, non-Hispanic	23	20	100.0	90.0	69.6	80.0	87.0*	90.0*	78.3*	70.0
Hispanic	42	21	90.5	85.7	61.9	66.7	81.0*	66.7*	69.1*	52.4
Other race, non-Hispanic	45	10	88.9	100.0	64.4	70.0	66.7*	70.0*	73.3*	70.0
Maternal education	977	301								
High school or less	105	53	87.6	77.4	63.8	69.8	72.4*	69.8*	75.2*	64.2*
Some college	345	139	86.7	87.8	65.2	70.5	71.3*	66.9*	61.2*	55.4*
College graduate	527	109	90.5	86.2	67.4	75.2	58.3*	41.3*	55.4*	41.3*
Marital status	975	304								
Married/domestic partnership	856	248	89.5	84.3	67.1	73.0	64.0	55.7*	59.0	51.6
Not married	119	56	84.0	91.1	60.0	67.9	67.2	71.4*	63.0	55.4
Annual household income	948	291								
≤$34,999	177	81	87.0	86.4	63.3	72.8	73.5*	70.4*	66.1*	61.7*
$35,000–$74,999	350	117	88.9	82.1	68.9	73.4	63.7*	58.1*	62.3*	53.9*
$75,000–$99,999	185	42	90.3	88.1	63.2	69.1	68.1*	45.2*	54.6*	38.1*
≥$100,000	236	51	89.0	88.2	68.2	74.5	56.8*	56.9*	55.5*	43.1*
Maternal weight status[3]	1023	313								
Underweight or normal-weight	496	88	90.5	87.5	65.3*	70.5	62.9	65.9	59.1	58.0
Overweight	269	93	90.0	87.1	72.5*	73.1	64.7	62.4	60.2	53.8
Obese	258	132	85.7	83.3	61.6*	71.2	67.8	54.6	58.1	50.0

[1] *$P \leq 0.05$ (chi-square test). IFPS, Infant Feeding Practices Study; OW/OB, overweight/obese; UW/NW, underweight/normal-weight.

[2] "No" included "1," "2," and "3" on the Likert scale and "yes" included "4" and "5" on the Likert scale.

[3] Underweight or normal-weight = BMI (in kg/m^2) <25.0; overweight = BMI of 25 to <30; obese = BMI ≥30.

income among overweight/obese children. Approximately 59% of mothers with underweight/normal-weight children and 53.6% of mothers with overweight/obese children pressured their 6-y-old to eat all of the food on his/her plate, and this was significantly associated with maternal race/ethnicity, education, and annual household income among underweight/normal-weight children and maternal education and annual household income among overweight/obese children ($P \leq 0.05$, chi-square test) (**Table 2**).

Among underweight/normal-weight children, the proportion of children consuming SSBs ≥1 time/d during the past month was highest among mothers who rarely set limits on sweets or junk foods (31.0%) and among mothers who reported regulating their child's favorite food intake (18.9%). Among overweight/obese children, the proportion of children consuming SSBs ≥1 time/d during the past month was highest among mothers who rarely set limits on sweets or junk foods (37.8%) (**Supplemental Table 1**).

Table 3 shows results from the multinomial logistic regression model after adjusting for covariates and with the use of SSB intake of 0 times/d as the reference group. Among underweight/normal-weight children, the odds of drinking SSBs >0 times to <1 time/d were higher among children with mothers who reported that if they did not guide or regulate their child's eating (regulate, restrict in response to child's appetite), their child would eat too much of his/her favorites foods (aOR: 1.46; 95% CI: 1.03, 2.09). In the same model, the odds of consuming SSBs ≥1 time/d were higher among mothers who reported that if they did not regulate their child's intake their child would eat too much of his/her favorite foods (aOR: 2.03; 95% CI: 1.25, 3.29) but lower among mothers who set limits on sweets or junk foods (aOR: 0.29; 95% CI: 0.15, 0.58). Among overweight/obese children, the odds of consuming SSBs ≥1 time/d were lower among mothers who set limits on sweets or junk foods (aOR: 0.16; 95% CI: 0.03, 0.79). Neither mothers' pressuring their child to eat enough nor to "clean the plate" was significantly associated with child's SSB intake in the adjusted model regardless of child's weight status (Table 3). Because the results from different types of SSBs (i.e., regular soda vs. other SSBs) are similar (data not shown), we only present the results for total SSBs in this article.

Discussion

In our study, mothers reported that ~1 in 6 underweight/normal-weight children consumed SSBs at least once per day during the past 30 d and almost 1 in 4 overweight/obese children consumed SSBs at least once per day. On the basis of the NHANES in 2007–2008, 2 in 3 US children aged 2–11 y drank any SSBs on a given day using a 24-h dietary recall data (33). Considering the potential adverse health consequences of consuming SSBs daily among children, such as obesity (9–11) and dental caries (12), intervention efforts to reduce SSB intake among children are important to establish healthy beverage intake habits.

Certain maternal characteristics were significantly associated with mothers' child-feeding practices in the present study. Although there is limited information on associations between parental characteristics and maternal feeding practices, an experimental study reported that parental restriction of access to snack foods was positively associated with child's weight for height and parental (both mother's and father's) education but was negatively associated with parental BMI (18). In other words, lower parental BMI was significantly associated with higher restriction of access to snack foods (e.g., crackers) at home (18). In the present study, mothers' weight status was significantly associated with regulating their child's intake of favorite foods among underweight/normal-weight children only. For example, we found that among underweight/normal-weight children, the proportion of mothers who reported regulating their child's favorite food intake was highest among overweight mothers.

Our results showed that certain mothers' child-feeding practices were significantly associated with their child's SSB intake after controlling for child and maternal characteristics. In

TABLE 3 Multinomial logistic regression analysis to examine the associations of mothers' child-feeding practices with child's SSB intake: IFPS II Year 6 Follow-up Study, 2012[1]

	SSB intake during the past month at 6 y of age by child's weight status					
	Underweight/normal-weight children			Overweight/obese children		
Mothers' child-feeding practices[2]	*n*	>0 to <1 time/d	≥1 time/d	*n*	>0 to <1 time/d	≥1 time/d
Make sure that my child does not eat too many sweets or junk foods	904			275		
No	102	Reference	Reference	41	Reference	Reference
Yes	802	0.77 (0.41, 1.42)	0.29 (0.15, 0.58)[3]	234	0.37 (0.08, 1.70)	0.16 (0.03, 0.79)[3]
If I did not guide or regulate my child's eating, my child would eat too much of his/her favorite foods	904			275		
No	301	Reference	Reference	72	Reference	Reference
Yes	603	1.46 (1.03, 2.09)[3]	2.03 (1.25, 3.29)[3]	203	1.63 (0.74, 3.58)	1.18 (0.47, 2.95)
Especially careful to make sure my child eats enough	904			275		
No	317	Reference	Reference	113	Reference	Reference
Yes	587	1.12 (0.77, 1.62)	1.24 (0.75, 2.04)	162	1.75 (0.79, 3.90)	2.09 (0.81, 5.38)
Encourage my 6-y-old to eat all of the food on his/her plate	904			275		
No	369	Reference	Reference	132	Reference	Reference
Yes	535	1.21 (0.84, 1.73)	1.11 (0.69, 1.79)	143	0.79 (0.37, 1.69)	1.02 (0.41, 2.51)

[1] Values are adjusted ORs (95% CIs) unless otherwise indicated, $n = 1179$. All 4 mothers' child-feeding practices variables were included in one model and adjusted for child's sex, maternal age, maternal race/ethnicity, maternal education, marital status, annual household income, and maternal weight status. SSBs include regular soda, sweetened drinks such as Kool-Aid (Kraft Foods, Inc.), lemonade, sweet tea, Hi-C (Coca-Cola Company), cranberry cocktail, Gatorade (Gatorade, Inc.), and others. The reference group was SSB intake of 0 times/d. IFPS, Infant Feeding Practices Study.

[2] "No" included "1," "2," and "3" on the Likert scale and "yes" included "4" and "5" on the Likert scale.

[3] CIs that did not include 1.

particular, both setting limits on sweets/junk foods and using restrictive feeding practices to regulate the child's intake of favorite foods were related to children's SSB intake, but in opposite directions. Regardless of child's weight status, children with mothers who set limits on sweets or junk foods were significantly less likely to consume SSBs at least once per day than their counterparts. It is possible that mothers who set limits on sweets or junk foods might also limit their child's SSB intake as a part of that effort. A previous study showed that the consumption of dessert (e.g., cakes, cookies, and pies) and sweet snacks (e.g., candy) was higher among children (aged 2–5 y) with a high SSB intake (≥200 kcal/d) than in non-SSB consumers (21). Moreover, because 14% of daily total energy intake was from added sugars among US children aged 6–11 y in 2009–2010 (34), it may be important for parents to reduce their children's added-sugar intake by limiting consumption of sweets or SSBs. At the same time, parents can offer healthier foods and beverages (e.g., fruit, vegetables, plain water, and nonfat/low-fat unflavored milk) to children instead of sugary foods and beverages.

Among underweight/normal-weight children, we found that children with mothers who believed that if they did not guide or regulate their child's eating their child would eat too much of his/her favorite foods were twice as likely to consume SSBs daily than were their counterparts. This finding is consistent with previous experimental studies, which showed that restrictive feeding practices can lead to increases in intake (18, 32). We were not able to find any published studies that examined associations between maternal regulation on child's favorite food and child's SSB intake. A recent experimental study suggests that our finding could reflect "reverse causation," with mothers using restrictive feeding practices in response to a child who finds palatable food very rewarding, who has lower levels of inhibitory control, or both (32). The restriction of sweet snacks increased consumption among preschool-aged children to a greater extent among children who found the food more highly reinforcing or who were more overweight (32). Of note, consistent with previous studies (9–11), the prevalence of daily SSB intake was higher among overweight/obese children and their mothers were more likely to report regulating their child's favorite food intake in our study. Further research is needed to confirm our findings. In addition, given that the availability of SSBs at home is positively related to children's SSB intake, removing SSBs from the home might be more effective in moderating children's intake of SSBs than having SSBs in the home and then attempting to restrict the child's access to them (7).

In our study, regardless of the child's weight status, mothers' pressuring their child to eat enough or to "clean the plate" was not significantly associated with their child's SSB intake after controlling for child and maternal characteristics. Typically, pressure to eat is used by caregivers with the intent to get the child to eat foods that the child does not eat on his/her own, that the child does not like, or that mothers think are healthy, such as fruits and vegetables, so it is unlikely this approach would be used with SSBs. For example, children's fruit and vegetable intake could be totally explained by parenting practice and maternal fruit and vegetable intake, but children's soft drink intake was not totally explained by parenting practices and maternal soft drink intake (5). Moreover, pressuring their children to eat healthy foods was associated with increased vegetable intake and praising their children for eating fruits and vegetables was related to increased fruit and vegetable intake and associated with decreased soft drink intake (5).

Our study is subject to limitations. First, study participants included in the Y6FU study represented a convenience sample consisting of mothers who were primarily non-Hispanic whites and highly educated, so the results are not generalizable nationally. On the basis of previous studies, black children and children with less-educated parents have a higher consumption of SSBs than do white children and children with more educated parents (33, 35). Therefore, SSB intake might be an even more important issue in high-risk populations than in our study sample. Second, SSB intake was surveyed in terms of frequency rather than volume. We were unable to quantify the association by the volume of SSB intake. Third, SSB intake and mothers' child-feeding practices in the IFPS II Y6FU study were self-reported by mothers and have not been tested for their validity. However, it is unlikely that the misclassification of maternal feeding practices depends on the consumption of SSB intake. For nondifferential misclassification, the reporting errors would bias the results toward null values. Last, statistical power for detecting significant associations between child's SSB intake and mother's child-feeding practices among overweight/obese children may be limited due to the small sample size.

In conclusion, SSBs were commonly consumed by young children in our study. The odds of drinking SSB at least once per day were lower among children with mothers who reported setting limits on sweets or junk foods regardless of child's weight status but higher among underweight/normal-weight children with mothers who believed they needed to restrict the child's intake favorite food to prevent overeating. Our results are consistent with recent findings indicating that limiting the availability of palatable snacks (e.g., by not purchasing them or keeping them in the house) might be an effective way to control intake (36). In contrast, restricting children's access to unhealthy foods that are available in the immediate environment can increase children's intake when children are given access to those foods. Given the need to reduce children's intake of added sugars, parents and other caregivers need evidence-based guidance to help children consume SSBs and other highly palatable foods in moderation.

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